MEDICAL TRIUMPHS OF THE WAR ZONE

New Serums, Antitoxins and Surgery Methods Will Remain as Permanent Gain in Years of Peace

An Interview With

Dr. Simon Flexner, Lieut. Col. U. S. Medical Corps

Director of Laboratories of the Rockefeller Institute for Medical Research

THE Great War, now approaching the close of its fourth year, has seen a smaller percentage of death and disability due to disease than any previous war of which there is adequate record, asserts Dr. Simon Flexner, director of laboratories of the Rockefeller Institute for Medical Research.

Dr. Simon Flexner

Without medical science suggests, the war conditions would be of unimaginable horror. The trenches of the Western front would be an unimaginable mass of diseased and suppurating flesh. In spite of the difficulties arising on a scale never before dreamed of, medical science and preventive sanitation have been able to control most of the familiar types of war disease and have reduced them to a point far lower than that of previous wars. New diseases have made their presence felt and rare infections have become common. But medical science has met most of these problems with adequate remedies, limited in their action only by the physical proportions and difficulties of applying them. A substantial list of new discoveries, methods, serums and antitoxins is the fruit of the scientific study of the war's medical problems, and some of these discoveries will retain a value to mankind in succeeding years of peace.

Tireless Worker In New Problems

Dr. Flexner, who is now Lieutenant-Colonel S. Flexner, M. C. N. A., is perhaps the world's foremost bacteriological expert. His work in connection with New York's infantile paralysis epidemic, which he helped to curb, is still remembered, and his antotoxin for cerebro, spinal meningitis is possibly the most definitely successful discovery of its kind in the past ten years. The Rockefeller Institute, under Dr. Flexner's direction, has likewise made material headway in the scientific fight against cancer. Since the war broke out in Europe Dr. Flexner has been tireless in his work to meet the new problems. Dr. Flexner has been decorated with the Cross of the Legion of Honor.

Dr. Flexner is a member of the National Academy of Sciences, the Association of American Physicians, the American Philosophical Society and the Amerian Association of Pathologists and Bacteriologists and other scientific societies at home and abroad.

The present war, Dr. Flexner asserted, stands in sharp contrast to all previous conflicts on a large scale by the relatively small proportion of death and disability caused by disease and infection.

"War and pestilence," he said, "have in the past been almost convertible or synonymous terms. If we wish to consider the relation of disease to wounds in the present war we should choose for comparison a war or wars waged on a large scale before the ushering in of the present era of preventive medicine, which is based largely on bacteriological investigation made in the last thirty years. Perhaps our Civil War would furnish a fair basis of comparison, since medical diseases as compared with wounds received in action far outweighed the latter as causes of disability and death. If to the medical diseases are added the infections of wounds occurring in hospital, the overweight is prodigious.

"The medical catastrophes of the Civil War are practically outside the memory of the present generation of surgeons and laymen. Happily, there is still among us a great surgeon who as a young man saw much active service in the field and hospital. Dr. W. W. Keen, of Philadelphia, in his writings has given vivid pictures of the destruction worked by the germs of typhoid and other fevers and those of wound infection, including the swift and deadly hospital gangrene. But the medical catastrophes of the Spanish-American War are within the memory of many of us. The havoc which typhoid fever made among our unseasoned troops in that short contest is matter of common knowledge, to be contrasted with the present virtual abolition of that plague as a military disease. Where formerly the camp and typhoid fever were inseparable companions, to-day, while that disease still prevails in civilian communities, it is all but unknown in our military establishments.

"The Russo-Japanese War, it had been supposed, was the high-water mark of sanitary wars. There seems good reason to believe, as a matter of fact, that the Japanese at least gave their troops the benefit of modern methods in sanitation. But the data available on which to base an estimate of the actual success with which the Japanese suppressed the medical diseases within their fighting forces are not great.

"The present war, of course, cannot be compared with any previous war, because of the disproportion between the numbers engaged and the manner in which the fighting is being conducted. Where formerly we reckoned in thousands we now reckon in millions of men engaged in actual warfare, and where formerly we spoke of hundreds we now speak of thousands aggregated behind the lines engaged in the manufacture of munitions and the other paraphernalia of warfare.

"Hence the medical problem of the present war embraces as never before enormous numbers of persons, both men and women, and not alone in the immediate theatre of fighting, but also in remote places where they are assembled in factories, etc. For the first time, therefore, entire populations of the belligerent countries are engaged in the operations of war. Just as it may be stated with truth that the scale on which the great war is being waged would be impossible without a high degree of industrial development, so may it also be said that it would be equally impossible without a high measure of sanitary control.

"This sanitary control has been gained laboriously within a generation, through the discovery of the nature of the bacterial causes and the manner of their propagation of the infectious diseases—both of medical and surgical nature."

Scientists divide the diseases of modern warfare into three groups, Dr. Flexner declares. Of these, the group emanating from intestinal derangements is now the least feared, having been effectually met by vaccination and sanitary control.

"The medical diseases attendant upon military organizations," he said, "may be divided into those causing intestinal infections—they are represented by typhoid fever, dysentery and cholera; those originating in respiratory infections and represented by the various forms of pneumonia and epidemic meningitis; those associated with eruptions of the skin and including smallpox, measles and scarlet fever; and then certain more irregular maladies, of which mumps may be taken as an example, since it may become very prevalent.

"Formerly the diseases of intestinal origin were most, while now they are least, feared. The reason for this change of view is to be found in the great measure of control exercised over them. Typhoid and the related paratyphoid fever have been abolished by vaccination; cholera has been and can always be brought under control by means, first, of ready methods of disinfecting the drinking water, and second, by vaccination. Dysentery has also been held down by water sterilization and by latrine sanitation. Moreover, recent investigations have brought bacillary dysentery, which is the variety of that disease prevailing in temperate climates, within possible control by means of vaccination, should an epidemic threaten."

Fighting Spread Of Pneumonia

Those who had supposed that pneumonia was merely an after effect of "taking cold" will be surprised to learn that war-time science has met the disease effectively with inoculation or vaccination.

"The commoner forms of pneumonia," says Dr. Flexner, "have in a large measure come under control. The bacteriology of that affection has now been wholly worked out; the disease is now recognized as contagious, which fact essentially affects the handling of the sick and the protection of the well from avoidable exposure; and for one of the severer types of this pneumonia we now possess a curative serum. Moreover, here again vaccination is holding out hope of substantial accomplishments; and if present indications are upheld it will be not outside the limits of the practical to immunize by a harmless kind of inoculation or vaccination even millions of men who would thus be protected from acquiring pneumonia of the severer forms."

Spinal meningitis, at one time one of the most baffling and cruel of diseases, has now largely come under the control of preventive medicine, Dr. Flexner points out. The method, largely developed during the war, he describes as follows:

"The germ cause of epidemic meningitis—the meningococcus—enters the body through the mucous membrane of the nose and throat, the so-called upper respiratory membrane. From that location the germ enters the blood, with which it is carried to the membranes about the brain and spinal cord, which are the sites of location or election for its growth inside the body. But not every person who carries the meningococcus in his nose and throat is in danger of acquiring meningitis. Indeed, considerably more persons carry that germ than develop the disease. These contaminated persons are called healthy carriers of the meningococcus, and they are a source of potential danger, since they convey the germ by coughing, sneezing, etc., to other healthy persons who are less resistant to infection and hence may develop the disease. At the present time bacteriology is competent to discover the dangerous healthy carriers of the meningococcus, and when they are present within the military organizations they are thus detected and segregated until they become clear. This process requires from ten days to several weeks, but it can be hastened by appropriate treatment.

"In this manner meningitis may be brought under control. Here again, should conditions warrant it, protection can, it appears, be conferred by vaccination. Moreover, we now possess an efficient and specific method of treating epidemic meningitis by means of a curative serum. Hence we feel forearmed to a high degree with reference to this disease, which in earlier wars in the character of spotted fever was regarded as one of the most fearful of pestilences."

One of the peculiar medical problems of war time was particularly related to American conditions. This, a severe form of pneumonia, has been the result of so trivial a disease as the measles.

"Unusual conditions surrounding America's entrance into the war," Dr. Flexner explains, "necessitating the rapid assembling of recruits in large numbers from all parts of the country, led to certain unforeseen problems of disease. It happened that in rural districts many adults had never been exposed to measles. Under conditions of camp life large numbers of cases of that disease of childhood, properly speaking, arose; and, following the measles, a form of pneumonia, known to succeed it at times in children, became unusually frequent and severe. This pneumonia is caused by other bacteria—a streptococcus, indeed—than those causing the usual pneumonia of civilian and military life. This particular medical military problem is now being studied from every point of view known to sanitary science, and it is a fair assumption that the near future will see it solved in greater or less measure."

As is generally known, the war has produced new diseases of its own. The most familiar of these, "shell shock," is not strictly a medical problem. But Dr. Flexner has investigated another, the so-called "trench fever," which has been the subject of much scientific study, and which is now on the point of being mastered as a result of the work of an American army officer, Major Richard P. Strong.

"In the East as in the West," says Dr. Flexner, "a very baffling and highly prevalent disease has arisen, to which for the sake of convenience the name of trench fever has been applied. The disease possesses, however, a series of synonymes according to the locality of its occurrence. It is known to prevail in Flanders and France and from the Vosges to the sea, on the Italian and Austrian fronts, at Salonica, and to a small extent in Mesopotamia, but not apparently in Egypt, Syria or East Africa. This particular fever rarely kills, but it is the most prolific source of disability with which the armies have had to contend. Moreover, the disability it causes, while usually measured by a few weeks, may extend into many months, and not infrequently its victims are permanently disabled and unable to return to the ranks. As a side effect it produces cases of irritable heart, in turn a disabling affection.

"Under the circumstances it is obvious that the solution of the riddle as to its nature and mode of propagation became of immediate military importance. The best scientific medical talent of the European belligerents devoted themselves to the task; but the solution was denied it—to be yielded just the other day to a medical commission headed by Major Richard P. Strong, of the United States army! The half dozen medical officers—with the exception of one Englishman, all Americans—who solved the riddle deserve, with the sixty-eight volunteers from our ranks, the credit of this great and highly important discovery. Trench fever is now to be regarded as an infectious and communicable disease of verminous origin, since it is propagated by the body louse. Thus to all the other reasons for carrying out a vigorous anti-louse campaign among the troops is added the supremely important one of reducing or abolishing trench fever. The army which accomplishes that task first will have won a large potential military victory over its adversary.

Typhus Routed By Hygiene

"The discovery of the verminous transmission of trench fever recalls the ravages of typhus in Serbia and Rumania after the Austro-German invasion. The underfed, unhoused and neglected crowds that swarmed out of the occupied regions fell ready victims to typhus, which prevails epidemically in the Balkans. Serbian and Austrian prisoners alike were stricken and died by thousands. The plague was arrested by improving hygienic conditions and by reducing louse infestation.

"Typhus fever disappears before a hygienic manner of living. Hence the advanced Western nations have become free of it. Its last strongholds, as considering its nature is now obvious, were the prison and the poorhouse. But the disease still exists in the East and still lurks in the backward parts of the West, in the Balkans, as mentioned, in parts of Russia, in Mexico, etc. Germany and Austria are being again invaded by typhus, which was brought in by Russian prisoners of war, and from there it has spread to the civilian populations. A number of eminent physicians in Germany and Austria have fallen victims to the fever. The eradication of the disease will become an important after the war problem with the Central Empires. Thus far typhus has not become a menace to the armies or the peoples on the Western fronts."

One of the curious medical paradoxes of the war, Dr. Flexner points out, is the fact that surgeons were at first hampered in their treatment of wounds because they knew too much. The operating room methods of recent years, before the war, had virtually dispensed with the lore of antiseptic surgery, because aseptic surgery, or the prevention of infection before it appeared, had wholly supplanted it. Thus the surgeons, face to face in France with conditions which made infection inevitable, were for a time at a loss.

"Modern surgery," Dr. Flexner explains, "has been developed since our Civil War. The constantly increasing knowledge and skill acquired by surgeons had enabled them within the past quarter of a century practically to abolish wound infection. Hence first so-called antiseptic, then aseptic surgery arose. The first dealt with wounds already infected and strove to render them clean or sterile, the latter resulted from a refined operative technique which excluded infection. Latterly infected wounds became rare in the best hospitals, and the mass of our surgeons of the present had had little experience in the treatment of surgical infection.

"Trench warfare was to change the whole outlook of war surgery. Had it been possible to succor the wounded immediately after injury, the terrible ravages of infection which have cost so many precious lives and have been the cause of so many thousands of permanent cripples would have been controlled. Moreover, had not so much of the actual fighting been carried out in, if not actually under, the ground in a country for centuries in a high state of cultivation, the almost perfect conditions favoring wound infection would not have existed. The element of delay, amounting to hours and days at times before the wounded could be rescued and brought to hospitals, added to trench warfare, yielded unimagined numbers and kinds of infected wounds."

Still another of the war's paradoxes is the fact that a certain class of diseases flourished in France precisely because the country was so civilized.

"Soil highly fertilized with animal excrement," Dr. Flexner explains, "contains the spores or seeds of the tetanus or lockjaw bacilli, of the bacillus of gaseous gangrene and of other bacilli, which, entering lacerated wounds, cause death and disorganization of the tissues; and besides these particular bacilli there are omnipresent the germs of suppuration. Thus it happened at the beginning of the war that tetanus or lockjaw was distressingly prevalent. The mortality, too, of the cases was very high. Now, on the other hand, the production of tetanus antitoxin, already known before the war to be a preventive when injected after injury, is so large that every wounded man can and does receive an injection as soon as he is brought to a dressing station, since which time that particular horror has been checked.

"The case of gaseous gangrene was quite different. The disease itself was known, as it arises occasionally as the result of accident in civil life. Its bacterial cause was discovered by Professor Welch, of Johns Hopkins University, in 1891, and has since received the name of Bacillus welchii. But gaseous gangrene on a large scale is an incident of this war. Like the tetanus bacillus, the gas bacillus inhabits the intestine of animals and is discharged with the excrement. It exists, therefore, in cultivated soil, and from the soil it gains access to the fur of animals and thus wool often carries it. In the subsequent handling of wool and its conversion into clothing, the gas bacillus may not be destroyed. When, therefore, particles of cloth, as frequently happens, are carried into wounds by bullets or shell fragments, or when dirt is likewise carried into them, gaseous gangrene may arise.

"The treatment of gaseous gangrene and suppurations has up to now been by surgical measures. Young surgeons have had to learn the principles of antiseptic surgery which those of aseptic surgery had displaced, and older surgeons had to revive their almost forgotten knowledge of the treatment of infected wounds. The new conditions led almost immediately in all the belligerent countries to the investigation of old and new antiseptic chemical agents. A supreme effort was being made to find means of meeting this prodigious menace of wound infection. Among all this laudable effort, the method which stands forth as having met the surgical emergency best is the one which goes by the name of Carrel-Dakin. The peculiarity of the method is that it applies in a particularly searching manner an old antiseptic—sodium hypochlorite, deprived of its caustic properties. The method, however, includes the bacterial control of the wound which gives the indication when it may be closed without risk. In this way many, perhaps innumerable, limbs have been saved and crippling has been averted, and large numbers of lives saved as well."

Development of The Antitoxins.

Among the scientists who have achieved eminence in the alleviation of war's horrors, Dr. Flexner mentions Dr. C. G. Bull, of the Rockefeller Institute, the discoverer of an antitoxin for the gas bacillus. This antitoxin, Dr. Flexner asserts, has ushered in a new era in the treatment of gaseous gangrene.

"It is applicable," he explains, "in the manner of tetanus antitoxin as a prevention of Bacillus welchii or gas gangrene infection, and it is more efficacious in the treatment of developed gaseous gangrene than is the tetanus antitoxin in developed tetanus. Moreover, recent experiments have proven that the tetanus antitoxin and gas gangrene antitoxin can be made jointly, so that a single serum injection carrying both can be administered successfully at one operation. The discovery greatly simplifies the problem of affording protection to the wounded from tetanus and from gaseous gangrene; and incidentally greatly cheapens the production of the protective serum."

If the war was made inevitable by modern industrial organization, as Dr. Flexner believes, it was equally made possible by modern medical science. At least, without modern medicine it could not have been fought on so extensive and protracted a scale. On the other hand, Dr. Flexner permits us to hope that some permanent blessings in the field of medicine may accrue to the world from the present catastrophe.

"The war on the colossal scale on which it is being fought," he says, "is an outgrowth of industrialized nations; that it can be so waged without still greater horrors than those now occurring is attributable to the progress of medical science within less than half a century and since the experimental method has been introduced into and widely applied in medical research. Undoubtedly war conditions have stimulated certain kinds of medical discovery and have therefore yielded certain results which will remain as permanent additions and benefits after the struggle is over. We are permitted to find what comfort we can in the crumbs of beneficial scientific achievement, while so much that is precious is being lost forever."

AN OUTPOST OF THE MEDICAL BATTLEFRONT

The defensive work of the doctors against disease, even more than the wonderful hospitals behind the lines, has been vital to the maintenance of the tremendous armies of this war. This is one of their outposts—a distilling plant furnishing safe drinking water to British soldiers in Flanders, where almost all undistilled water carries a multitude of diseases.

THE MODERN HUN IN THE WORLD OF ART

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gracious of all the European art periodicals, was compelled by force of practical conditions to suspend publication for a time, but it has been revived, and now appears in thick quarterly numbers, alert and luminous as ever. Some time after the war broke out I wrote to M. Doucet about the half dozen societies to which he has been in some sort a Medici, the society for the reproduction of old drawings, the society for the promotion of the engraver's cult, and so on. Would the rest of the St. Aubin catalogues be brought out? Would the Pisanello facsimiles be completed? Of course they would. But the staffs had all gone to the war. When they returned, triumphant, the various publications would be resumed. No discouragement, meanwhile.

Paris is never discouraged. In this new Salon there is a picture by Guillaume, "The Hour of the Taubes." A group of idlers, a child with his hoop in the foreground, is looking on as at a show. It is the spirit of Paris incarnate. The art sales continue even while shells are dropping in the city, and as the dispersal of the Degas collection clearly showed only a few weeks ago, prices are, if anything, higher than before the war. Let us not forget, either, that at the Panama-Pacific Exposition in San Francisco, in the summer of 1915, France made a fine contribution to the art collection, necessarily smaller than it would have been in times of peace, but still on a generous scale and characteristically creditable. There has been a great quantity of brilliant work done by French artists at the front, paintings and drawings by Flameng, Sabatier, Hoffbauer, Jonas and many others, invaluable as records and sometimes of much artistic charm, for which the world will long be grateful. But chiefly the thing which we shall longest remember is that which I can only describe as the ground swell, the national spirit underlying these individual performances, the French passion for beauty, defying the Hun forever.

What is to be the upshot of it all? How will the genius of art emerge from the war, not only in France, but everywhere in the world where art is honored? All the countries are involved, and though France and Belgium, for obvious reasons, have chiefly concerned us in this inquiry, there are matters of interest to be noted elsewhere. Italy has suffered much, especially in Venice. England, whose monuments have on the whole escaped injury, has also her share in the artistic annals of the period. She has sent some admirable artists to the front, Muirhead Bone at their head, and she, too, like France, has gone consistently ahead with her artistic affairs. The Royal Academy has "carried on." The Walpole Society has kept up its delightful "Annual." Even as I write there comes to my desk a luxurious folio by Dr. Williamson, published by the John Lane Company. It is "The Life and Works of Ozias Humphry," the sumptuous kind of volume which one would have supposed the war had postponed indefinitely. And an English publishing house, that of the Macmillans, is collaborating with Hachette, in France, over the making of a new series of European guide books, to take the place, once and for all, of the hitherto ubiquitous Baedeker. What a cheering bit of news that is! Baedeker has been serviceable, to be sure, but the very name is hateful now, when one reflects that the Germans who made those books, and prepared the maps for them, may easily have taken part in the work of espionage which the Hun has never developed more skilfully than while enjoying the hospitality of foreign lands.

The new Anglo-French guides may be set down as one tangible blessing which is to be vouchsafed students of art after the war. But it is the intangible fruitage of the future that interests most inquirers. upon art, they ask, and wonder if it will not include the liberation of new ideas, new principles, new What is to be the effect of the war schools. The question is, frankly, unanswerable. There is no evidence on the horizon. No one knows what the artists are going to do when they get back from the fight. But any one may guess, and I have, for my own part, no expectations whatever of revolutionary movements, least of all contemplating the likelihood of that kind of "independent" activity which is illustrated by the cubist and his fellow faddists. I think the artist will be very weary, in a mood for rest and the old sanctities of home. He will turn to the time-tried masters as he will turn to the people he loves, his family and his friends. The classics will steady his harassed mind and spirit as the quietude of familiar, cherished scenes will soothe his jangled nerves. That, after all, seems to me a reasonable hypothesis. For if there is one thing that the bestiality of the Hun does it is to throw us back upon the ancient inviolable law, to make us cling with renewed faith to all that is honest and of good report. No matter how much the war may stir the imaginations of artists—and there, I believe, we may look for remarkable developments—it ought to strengthen rather than weaken their hold upon the fundamental standards which are the life blood of art.

THE HOUR OF THE TAUBES—By Albert Guillaume

A picture in the Salon, now open in Paris, denoting the scornful mood in which the citizens regard the destructive efforts of their enemies